Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at http://about.jstor.org/participate-jstor/individuals/early-journal-content.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

In connection with the subject of vitamines, or food accessories essential to growth which are not included among the ordinary food principles, it is interesting to note that corn carries both an oil-soluble and a water-soluble accessory. Professor Hughes at the Kansas State Agricultural College has shown that pigeons which had been brought to the last stages of polyneuritis by feeding polished rice or kafir corn may be entirely relieved from the symptoms by administering twenty grains of corn.

The nutritional characteristics of corn have been but imperfectly treated in the foregoing, but it is hoped that enough has been given to show the great variety manifested by these characteristics and the practical importance of scientific interest in them.

American Highways.

J. A. G. Shirk, M. A.

Nothing is a better indication of the degree of civilization attained by any nation than its roads. Many places in Europe and Asia we find yet to-day remains of the great chain of roads built by the Romans. Every block and stone in them is typical of the vigor and strength of the Roman civilization. All these roads led to Rome, so that she might send her armies out quickly to quell any uprising and also that the world's commerce might center in their capital city. In China we find the main roads as mere paths, and thus they have been for centuries, typical of a civilization that is without ambitions or ideals.

Roads are made because there is some imperative need for a means of getting from one place to another. The lower animals resemble man in this particular. Those animals lower down in the scale of life either live upon the food about them, or are carried about by the forces of nature or by larger animals. But as the needs increase, the paths they follow become longer and better defined and we find that there is established what might be termed a highway. In this continent, the best example of permanent animal trails were those made by the American buffalo which led to their feeding grounds, their watering places, and salt licks. The first real thoroughfares of America were probably those made by the big game animals, such as the buffalo. These plunging animals, keen of instinct, moving in vast hordes, broke great roads across the continent along the summits of the watersheds, beside which the Indian trails were mere traces. These roads were swept clear of debris in summer and of snow in winter, so that the early settlers found them of the greatest use in the settlement of the wooded country just west of the Alleghenies. These paths led to the passes through the mountains, and beside the small streams or springs which were good watering places. Along these buffalo trails followed the slow plodding oxen drawing the ponderous wagons of the settlers, and thus the trails were changed into roads, which by fortification and small improvements became the great arteries of travel and traffic between the coast colonies and the settlements and trading posts further west.

The Indians made many trails for purposes of war and peace. Each tribe generally had a hunting ground at some distance from its usual place of abode. They made their chief habitations at the places where it was better to winter, or to repel the attacks of their enemies, and as the game would soon be almost wholly exterminated in that vicinity frequent excursions would be necessary to the localities where there was still an abundance of wild animals. When the tribes were at peace there was a hunting ground for each tribe, and trails were made to these regions. These trails were never more than mere paths, bordered by the forest, and often made impassable by storms felling trees across them. They were generally laid out so as to follow the high ground and missing the numerous bogs which impede travel yet to-day on many eastern roads, especially in the wet season. These trails were never improved by the Indians, who merely shifted the trail if some difficult barrier developed. The only vehicle used by him was two poles, with a few cross pieces, tied to a pony, and as the party always traveled single file, the path was very narrow. The trails were never blazed, this being an invention of the less instinctive white man. The war trails were often broader and in better condition because of their almost constant use by the larger parties of warriors. Many of these war trails became the wagon roads for the brave and courageous pioneers, chief among them being the "Connecticut Path," the "Iroquois Trail" and the "Virginia Warriors' Path." The trader also followed these Indian trails because they led him to the people with whom he wished to barter, and likewise the missionaries and explorers who gave us the first knowledge of the great fertile country separated from the coast settlement by the barriers of mountains.

Daniel Boone laid out the first road from Virginia to Kentucky for the Transylvania Trading Company, and Captain Cresap acting for the Ohio Company blazed the first trail from the Potomac to the Ohio. Both of these roads followed Indian trails and buffalo traces most of the way. Washington followed narrow Indian trails on his mission to Fort Necessity. Braddock followed the same rough path next year, making a great gorge of a road twelve feet wide still visible to the place of his defeat. This road is also known as the Virginia Road. Few roads ever cost so much, ever amounted to so little at first, and finally played such an important a part in the development of the continent. It was built by Major-General Braddock in 1755 during the French and Indian war. The Atlantic coast was settled largely by the English, who built towns and villages, and developed the resources of the country. The Mississippi valley was first discovered by the French who made lengthy voyages of exploration along the navigable streams. They made friends with the Indians and adopted many of the Indian habits and customs, but never actually occupied the territory as did the English on the coast. Forts were constructed at the mouths of rivers and at the principal portage paths. The French believed in the strength of natural barriers. In Europe, France was separated from both Spain and Italy by high mountain ranges, and she had not been taught by a Napoleon that such barriers while difficult to overcome are not unsurmountable. France lost her empire in the New World because she trusted too much in natural barriers and fortifications. At Louisbourg and Quebec the French commanders trusted in the strength of crags and precipices, and in the central empire they trusted in the Alleghenies. When Braddock first came to assume the offensive against the French he requested the governor of Pennsylvania to construct a road to the Ohio river, while he would lead his army over the road from Virginia, formerly used by Washington. The road was cut twelve feet wide to allow his wagons and artillery to pass through, and finally when he had all but won over his foe he was defeated by the cunning of his Indian antagonists. As soon as the news of Braddock's defeat was received by the men who were cutting the shorter road across Pennsylvania, they immediately fled back to the eastern settlements. This victory of the French and Indians aroused the colonists, who before had given very little support to Braddock. In fact we might say that the lack of coöperation on the part of colonists was largely responsible for the failure of Braddock's mission.

Three years later Brigadier-General Forbes was assigned to the unfinished task, and he led a more united army west over the road formerly started by Governor Morris of Pennsylvania. This road was completed to the present site of Pittsburg, and terminated in what is now Forbes avenue of that city. Forbes built several forts, conquered the French and Indians, and firmly established the English in the region of the Ohio river, but like Braddock, he gave his life for the effort. This road was much shorter than the Virginia road laid out by Braddock, and became the military road to Ohio and the Western Empire. Over it also was carried the trade between the east and the west. Pennsylvania improved this road just after the Revolutionary War, and it became the connecting link that bound the state together.

What General Forbes accomplished for the settlement of Ohio by the opening of the Pennsylvania road Boone did for Kentucky in the opening of the famous Wilderness road. Boone was probably the first white man to visit the fertile blue grass region of Kentucky, which was, even in the wild condition, a second "Garden of Eden," as he described it. But a veritable wilderness separated it from the country already settled, and the hardships endured by the early pioneers who sought to reach this favored location were almost unendurable. Finally Boone led a party which blazed a new trail leading from the Virginia road, and also fortified it at a few places. This road was the longest, blackest and hardest road of pioneer days, but it is the only one which has held the oldtime name. The reason the name has been retained is the fact that the road has also retained considerable of its ancient characteristics.

The roads which have been described thus far were never improved to any great extent. When first laid out they were merely paths cut through the forest leading from one fording place to another, and generally followed the high ground so as to miss the bogs. Most of them had two roadways, a wet and a dry one being laid out at many places. A wet road was one used during the wet season, and the dry road followed the lower ground which could be traversed only during dry weather. The term roadway is also quite misleading, since the only ones wide enough for wagons were those constructed for military purposes, as Braddock's Virginia road and Forbes' Pennsylvania road. The trails first laid out were generally along more or less well-defined Indian trails, and the pack horse became the only possible method of conveying passengers or freight.

The first step in improving the roads was in widening of the trail so as to allow wagons to be used. The next was the corduroying of the worst wet places with logs laid across the road and long enough to sustain the vehicle. Before this was done each teamster tried to avoid the deep ruts produced by the wagon preceding his own, and then he might get into a worse place and mire down completely and even lose his oxen or horses and wagon. It is stated that at times five ox-teams were necessary to pull a load of one ton. Some of the local names of settlements or roads reveal the nature of the highway. One town in Indiana was named Mudholes, and the road from Pickaway Plains of Ohio to Detroit was known as the "Bull Skin Road" on account of the large number of dead oxen along the route.

The cost of transporting freight under these conditions may be imagined as very high, when a pack horse could only carry from 150 to 200 pounds. Even the wagon rates were almost prohibitive, the cost from Philadelphia to Pittsburg being from $5.00 to $10.00 per hundred pounds, according to the nature of the roads. This was a big reduction from the pack-horse rate, and consequently the pack-horse men very bitterly opposed the widening and improving of the trails. They destroyed vehicles, assaulted drivers and passengers, vindicating their acts by stating that the new method was destructive of trade and caused deterioration in the breed of horses and the physical strength and vitality of men. Their opposition was futile, and most of the pack-horse men probably went into the business of teaming or coaching. It is quite probable that some of these same men may later have taken part in the similar acts of the teamsters when the first railroads were constructed. At any rate we know that similar arguments were used to incite rioting. This has, however, been the usual attitude of any class of workmen when some new invention or industry made it possible for one man with skill to do the work of several.

The minor roads were usually mere trails leading to the main thoroughfares, and at first were wholly unimproved. At the same time that the states were "corduroying" or "macadamizing" the more prominent roads, the minor ones were being similarly improved by the privately owned turnpike companies. These companies were granted the privilege of constructing roads and charging tolls to reimburse them. Some of these turnpikes were lucrative investments, and consequently many such roads were constructed that never returned the original capital to the investors. Many were built, however, from exactly the same motive that later made the people vote bonds for the railroads, viz., the development of the community.

In 1800 President and Mrs. Adams tried to get from Baltimore to Washington, but such was the condition of the roads that they became lost in the Maryland woods. This shows the condition of the roads leading to our capital city at that date.

Probably the first roads that were placed in really fine condition were some of the private turnpikes. The Philadelphia and Lancaster Turnpike

Road Company started work on that road in 1792, and completed it in 1794, at a cost of $465,000. The road was started 100 feet wide, but it proved so expensive that it was reduced to almost one-half that width. This road was very straight, except when detours were absolutely necessary to reduce the grades. It is to-day paralleled by the Pennsylvania Railway almost the entire distance. Not only was it laid out well and constructed of generous width, but the construction was well done. The stones used were required to pass a two-inch ring, and were thoroughly compacted by allowing traffic over each layer before another was applied.

This road had no competition for twenty-one years, and then the horse cars and canals came. It was then left to deteriorate until the public refused to pay the tolls. Seventeen miles were abandoned in 1880, and taken up by the townships, which have placed these sections in fine condition. Ten miles, however, was retained until 1899 when it was sold to a traction company for $10 per share. These shares originally cost $300 per share, and out of the 1,200 shares first issued, 200 were kept as souvenirs or were lost.

The finest road of that period was the Cumberland Road, generally know as the National Road, because it was and is yet the only great road constructed by the national government. The hardships endured on the road by those who went to settle in Ohio and Kentucky prevented many others from attempting the trip, and this barrier of bad roads was not only hindering the further development of these states, but was also contributing to the general feeling of unrest which made the western settlers think that perhaps they should organize a separate government. Henry Clay, being a Kentuckian, became an earnest advocate of a national highway connecting the West with the East, which was Washington's cherished dream. The project received a great impetus when Albert Gallatin, secretary of the treasury in 1806, urged such works of internal improvement. The first appropriation of $30,000 was made March 29, 1806, and the last on June 17, 1844, a total of $6,824,919.23 being appropriated for this road. The original estimate of the road was $6,000 per mile, but actually cost $9,745 per mile from Cumberland, Maryland, to Uniontown, Pennsylvania, and $13,000 per mile from Uniontown to Wheeling, Virginia, now West Virginia. The excessive cost of the second portion was probably due partly to too liberal contracts. The road was started in 1811 and during the next thirty years was completed to Indiana and graded part of the way across Illinois. The portion built to Wheeling was completed in 1818, and at once became the most famous American highway. Over this sixty-foot rock road passed a constant stream of wagons, mostly bound for the plains of the fertile valleys of the Ohio and Mississippi rivers. The enthusiasm of the western settlers knew no bounds when it became known that the road was to be constructed, and from that time the East and West were tied together firmly. In fact, the effect upon the political life of the western territories was even greater than upon their commercial life, because long before the road actually reached them, a new and more rapid form of transportation was developed. When the railroads finally took almost all of the interstate commerce and travel, the road was abandoned without completing it, as first planned, to the Mississippi river.

From the engineering standpoint it was probably the best rock road constructed in America, there being three layers of stone used, good drainage, low grades, and excellent bridges. It was almost as straight as Peter the Great's famous road to St. Petersburg, which was laid out by the imperious monarch himself by the simple process of laying a ruler down on the map between the desired terminals. On the engineering staff we find the names of McKee, who fell at Beuna Vista, Williams, at Monterey, and Major-General Mansfield, at Antietam.

Much objection to the construction of the road was made on constitutional grounds, but it was finally constructed under the authority given to the government to regulate post roads and the mails. However, when the question of keeping the road in repairs came up it was thought best to turn it over to the states within whose borders it passed for the purpose of erecting toll gates and using the revenue obtained in this manner for keeping the road in repair. The position of toll gate keeper was quite a lucrative one, but Ohio alone received $1,139,795.30 from tolls from 1831 to 1877. This indicates the vast amount of travel over the road even when railroads and canals were being rapidly developed.

For at least three sessions of congress previous to the last appropriation for the National Road, various committees and individual members urged that the remaining portion of the highway be made a government railroad instead of a wagon road, but when each time the matter came to a vote, these amendments were struck out, and the original plan was pursued.

The principal rivals of macadamized roads were those known as plank roads. The first plank road in America was constructed in 1835-'36 at Toronto, Canada, and the first in the United States in 1837, near Syracuse, N. Y. This form of roadway proved very popular, there being 2,106 miles constructed in New York alone during the next fifteen years. Plank roads were made of 3″ x 8″ planks laid crosswise of the road, and fastened to stringers. Such roads cost about $2,000 per mile, or about one-fifth of the cost of the Cumberland Road. The tractor power was much less than on the rock roads, one team easly pulling as much as six tons on low grades. Sometimes these plank roads were constructed as a neighborhood enterprise, and were only second to a log rolling in popularity as a social event.

With the rapid rise of the railroads, there came a corresponding decline in road making. The Federal government ceased entirely to devote any attention to the subject, and the same was true of almost all of the states. The power to improve and repair the roads was left almost wholly to the townships or small road districts. The expense for this work was largely borne by a poll tax which might be worked out by each individual if he so chose. The road overseer was generally quite ignorant of the proper methods of road drainage, establishing of economical grades, and kindred subjects. Consequently we had for many years a system of roads only good in the dry seasons.

In the last twenty-five years there have been two important developments which have done a great deal for the improvement of our roads, and are destined to accomplish much more in the near future. The first is the application of efficiency principles to the farm, and the second is the use of the automobile for recreation. Each will do its own part towards making our roads what they should be.

Both are being aided in every way by the manufacturers of road building material or machinery. The national government is now doing much to help the efficiency of the farm through the Department of Agriculture and its branch, the Office of Public Roads, and Rural Engineering.

Perhaps it might be well to give a few reliable estimates concerning how the question of the roads affects the profits of the farm. America has a marvelous railroad system reaching throughout the length and breadth of the land, and yet the average farm is located from eight to ten miles from the nearest station. Also, probably seventy-five per cent of the commerce of this country starts on the wagon roads, since we are essentially a producer of raw materials. We may conservatively estimate that at least $700,000,000 is expended annually in getting our produce to the railroad. This cost is exorbitant, and the great problem of the Office of Public Roads is how much of this can be saved by a good system of country roads. It is simply a matter of striking the proper balance between the saving effected by good roads and the expense incurred in improving and maintaining them. This has been worked out very carefully, and the justifiable expenditure in relation to the tonnage or number of vehicles passing over the road has been determined with sufficient accuracy. It will be seen at once that according to this principle, a system of public roads should, like a railroad system, consist of a limited number of well-constructed trunk lines with a larger number of feeders of more moderate cost. Any community which does not act on this principle is wasting money, for if all are constructed poorly the saving in hauling is not as large as it should be and also the expense of maintenance is greater, while if all are made of expensive construction the saving in hauling might not justify the large expenditure.

Poor roads mean, however, not only an economic waste in hauling but they hinder greatly the social and intellectual development of the rural community. Consolidated schools, community centers, and good country churches are only possible where the roads are good, especially in the winter season when the country people have the leisure time for social and intellectual advancement. It seems to have been demonstrated conclusively that where good roads permit of a proper social development the young people are more likely to remain in the country even after taking advanced school work in the higher institutions of learning.

The merchants are aiding the good-roads movement in every possible way, in some instances building a mile or more of good road to serve as an object lesson to the farmers and enlist their coöperation. The merchant realizes that good roads are a valuable asset to his business, and that town which has a network of well-constructed roadways converging to it will enjoy a much larger patronage from the country people and the residents of the smaller communities.

The problem of road building has in the past been almost wholly left to the small unit, as the township or road district, but during the past decade many states have passed laws making it possible to obtain state and county aid. The New York law empowers the state to pay fifty per cent, the county thirty-five per cent, and the township fifteen per cent. In Ohio the state pays twenty-five per cent, the county fifty per cent, and the township twenty-five per cent, this last twenty-five per cent being divided into fifteen per cent by the township as a whole, and ten per cent by the owners of the abutting property.

In New Jersey the state pays one-third, the county one-third, and the owners of adjacent property one-third. Many other states have similar laws, but as yet Kansas given no state aid.

The Hodges law allows the township to pay twenty-five per cent and the property owners seventy-five per cent. The seventy-five per cent is generally levied on a zone not more than two miles on either side of the road. In the main it has been fairly satisfactory, but before we shall have an extensive system of roads we must institute the state-aid plan. The plan proposed by several prominent men is for the state to issue $25,000,000 of bonds to get the necessary funds for the improvement of the roads. Many believe that the next legislature will take the initial steps in getting this matter before the people of Kansas. This plan has produced more mileage of good roads in Ohio than any other state of the Union of approximately the same size.

But we are probably reading and hearing more to-day about the long transcontinental highways and the connecting roads between large cities, chief among those which have already been marked out being the Lincoln Highway from New York to San Francisco, and the "Old Trails Road" from Washington to San Francisco. This follows Braddock's road from Washington to Cumberland, Md.; the Cumberland or Old National Road from Cumberland to St. Louis; Boone's Lick Road from St. Louis to Old Franklin; the Santa Fe Trail from Old Franklin to Santa Fe, N. M., and the Grand Cañon route from Santa Fe to San Francisco. All of these are noted trails, but the last one is best known here. It did for the development of the great southwest what the Cumberland road had done from the central states.

These projects are being pushed vigorously by the automobile associations of the various states through which they pass, and also by local commercial interests who derive benefit from the amount of travel which the roads produce. Parts of these roads have been put into excellent condition, but the major portions are only marked, and much work needs to be done upon them before it will be possible to really "See America" as it has been possible to tour Europe before the outbreak of the present war. The great barrier of mud has prevented our eastern population from really coming into intimate contact with the western people. They come on the trains, stay at hotels which cater to their trade, and leave for their homes with little or no conception of the spirit which animates the West.

This condition must not continue, but the only solution is Federal aid. In the case of the Lincoln Highway, there are several states through which it passes where it is impossible to make the necessary improvements. Nevada has 425 miles of the highway and only 80,000 people. The same is true of Utah, and to a lesser extent of Nebraska. The highway is in almost perfect condition to Indiana, but from there on west it is mainly a dirt road, although much better kept than the neighboring roads. Last summer it is estimated that 5,000 men were busy at one time improving this highway, and when we remember that the concept of a transcontinental highway is less than three years old, we may be well pleased at the results already accomplished.

These extended highways will do more to thoroughly knit our citizens together in the firm bonds of a mutual understanding of each other's problems than any influence now discernible.

But, as stated before, such great enterprises cannot be successfully completed without Federal aid, and it appears now probable that the national government will in the near future reëmbark on the great problem of road building with which it has done almost nothing for over half a century. Then, when nation, states, counties, and local communities work together, we may construct such a network of roads as will make them the pride and boast of every American citizen.

A Study of Foods for Infants.

Leon A. Congdon, B. S.

When we come to consider the great number of proprietary foods for infants which are rapidly flooding the markets, we cannot help but pause and study the value of these proprietary products. The reason for such a flooding of the market with these proprietary foods is evident because, first, a great many mothers are unable to nurse their children, and, second, a great many will not nurse them because of a so-styled reason of their duty to society. The first reason should have the sympathy of everyone, but the second is no reason at all and should be discouraged.

This article will not deal especially on the infant-feeding question, but will be confined to a study of foods for infants, giving such facts as will tend to discourage the use of proprietary foods. When we stop to study the composition of the largest sellers among the proprietary foods for infants we are impressed with the fact that they are comparatively useless, and in some cases harmful to children under one year of age. In fact, a study of the available statistics in this country and abroad goes to show that high infant mortality is due either to the improper feeding of cow's milk to infants up to six or nine months of age, or, in all probability, is due to the feeding of artificially prepared patent baby foods which set up a disturbance of the child's delicate digestive organs. The late Walter Wyman, of the United States Public Health Service, said that it is recognized that gastro-intestinal disease is the largest factor determining infant mortality, a condition in great measure due to improper methods of feeding, and that this enormous loss of potential wealth is of grave concern to the state and worthy of most careful consideration.

Chart I shows the relation of the nutritive ratio to the physiological fuel value of the most common proprietary foods for infants found in this country. This chart also shows this relation in comparison with